

WHAT IS CLAIMED IS:

1. An apparatus for drying solutions, comprising:
a first base plate; and
a first manifold disposed above said first base plate, said first manifold and said first baseplate forming a cavity therebetween, said manifold including one or more hollow tubes that extend into the cavity to provide gas therein.
2. The apparatus according to claim 1, wherein said one or more hollow tubes extend into one or more vessels when the vessels are disposed within the cavity.
3. The apparatus according to claim 1, further comprising:
a first base plate heater.
4. The apparatus according to claim 3, wherein said first base plate heater comprises:
a substantially flat heater disposed on a surface of said base plate.
5. The apparatus according to claim 1, further comprising:
a filter disposed upstream of said first manifold.
6. The apparatus according to claim 1, further comprising:
a fan disposed upstream of said first manifold.
7. The apparatus according to claim 1, further comprising:
a heater disposed upstream of said first manifold.
8. The apparatus according to claim 1, further comprising:
an exhaust fan disposed downstream of said first manifold.

9. The apparatus according to claim 1 wherein said first base plate comprises means for receiving at least one removable vessel tray.

10. The apparatus according to claim 1 wherein said first base plate comprises means for receiving at least one removable vessel tray that holds a plurality of vessels.

11. The apparatus according to claim 1, wherein said first base plate comprises a plurality of vessel cavities.

12. The apparatus according to claim 1, wherein said manifold comprises:
a nozzle plate that includes an array of passages, wherein said one or more hollow tubes extend from the passages and into the cavity; and
a baffle disposed above said nozzle plate, said baffle and said nozzle plate defining a plenum therebetween, wherein said first nozzle plate and said first base plate define the cavity therebetween.

13. The apparatus of claim 1, further comprising:
an electrical control system.

14. The apparatus of claim 13, wherein said electrical control system comprises:
an open-loop electrical control system.

15. The apparatus of claim 13, wherein said electrical control system comprises:
a closed-loop electrical control system.

16. The apparatus of claim 13, wherein said electrical control system comprises:

a combination open-loop and closed-loop electrical control system.

17. The apparatus according to claim 1, further comprising:

a level detector disposed within the cavity.

18. The apparatus according to claim 17, further comprising:

an electrical control system that controls a temperature of an inlet gas based, at least in part, on an input from said level detector.

19. The apparatus according to claim 17, further comprising:

an electrical control system that controls a pressure of an inlet gas based, at least in part, on an input from said level detector.

20. The apparatus according to claim 1, further comprising:

a hinge that hingedly couples said first base plate to said first manifold.

21. The apparatus according to claim 20, wherein said first base plate has a closed position at which said base plate is at an angle α .

22. The apparatus according to claim 21, wherein said angle α is between five and thirty-five degrees.

23. The apparatus of claim 1, further comprising:

a base coupled to said first base plate;

a second base plate coupled to said base; and

a second manifold disposed above said second base plate;

wherein said second base plate and said second manifold are configured substantially the same as said first base plate and said first manifold.

24. The apparatus according to claim 24, further comprising:
 - a duct system that includes:
 - a common branch,
 - a first branch coupled between said common branch and said first manifold, and
 - and a second branch coupled between said common branch and said second manifold.
25. The apparatus according to claim 24, wherein said duct system comprises a T-branch duct system.
26. The apparatus according to claim 24, wherein said duct system comprises a Y-branch duct system.
27. The apparatus according to claim 24, wherein said duct system further comprises:
 - a heater.
28. The apparatus of claim 1, wherein said one or more hollow tubes comprise:
 - a hollow tube that includes one or more substantially downwardly directed openings.
29. The apparatus of claim 1, wherein said one or more hollow tubes comprise:
 - a hollow tube that includes one or more substantially horizontally directed openings.
30. The apparatus of claim 1, further comprising:
 - a vapor recovery system disposed downstream of said first manifold.

31. The apparatus of claim 1, further comprising:
a vapor recovery system disposed within said first manifold.
32. The apparatus of claim 31, wherein said vapor recovery system comprises:
a vapor recovery plate.
33. The apparatus of claim 31, wherein said vapor recovery system comprises:
a vapor recovery hollow tube disposed coaxial to one or more of said one
or more hollow tubes.
34. A method for drying a solution containing macromolecules, comprising the
steps of:
 - (1) receiving a vessel containing a solution; and
 - (2) directing a gas into the vessel.
35. The method according to claim 34, further comprising the step of:
 - (3) Filtering the gas.
36. The method according to claim 34, further comprising the step of:
 - (3) Heating the gas.
37. The method according to claim 36, further comprising the steps of:
 - (4) monitoring a temperature of the gas; and
 - (5) adjusting the temperature of the gas to correspond to a desired
temperature.
38. The method according to claim 34, further comprising the step of:
 - (3) Pressurizing the gas.

39. The method according to claim 38, further comprising the steps of:

- (4) monitoring a pressure of the gas; and
- (5) adjusting the pressure of the gas to correspond to a desired pressure.

40. The method according to claim 34, further comprising the step of:

- (3) heating the solution in the vessel.

41. The method according to claim 41, further comprising the steps of:

- (4) monitoring a temperature of the solution; and
- (5) adjusting the temperature of the solution to correspond to a desired temperature.

42. The method according to claim 34, further comprising the steps of:

- (3) performing steps (1) and (2) on a plurality of vessels.

43. The method according to claim 34, further comprising the step of:

- (3) tilting the vessel.

44. The method according to claim 34, wherein step (2) comprises the step of:

- (a) directing the gas substantially at the solution.

45. The method according to claim 34, wherein step (2) comprises the step of:

- (a) directing the gas substantially horizontal to the solution.

46. The method according to claim 34, further comprising the step of:

- (3) sensing a moisture content of the solution; and
- (4) terminating steps (1) and (2) when the moisture content of the solution reaches a predetermined level.

47. The method according to claim 34, further comprising the steps of:

- (3) pressurizing the gas to a first pressure when a level of the solution is at a first level; and
- (4) pressurizing the gas to a second pressure when the level of the solution in the vessel is at a second level.

48. The method according to claim 34, further comprising the steps of:

- (3) heating the gas to a first temperature when a level of the solution is at a first level; and
- (4) heating the gas to a second temperature when the level of the solution in the vessel is at a second level.

49. The method according to claim 34, further comprising the steps of:

- (3) heating the solution to a first temperature when a level of the solution is at a first level; and
- (4) heating the solution to a second temperature when the level of the solution in the vessel is at a second level.